

**U.S. FISH AND WILDLIFE SERVICE
SPECIES ASSESSMENT AND LISTING PRIORITY ASSIGNMENT FORM**

SCIENTIFIC NAME: *Spermophilus brunneus endemicus*

COMMON NAME: Southern Idaho ground squirrel

LEAD REGION: Region 1

INFORMATION CURRENT AS OF: September 30, 2005

STATUS/ACTION

☐ Species assessment - determined we do not have sufficient information on file to support a proposal to list the species and, therefore, it was not elevated to Candidate status

☐ New candidate

☒ Continuing candidate

☐ Non-petitioned

☒ Petitioned - Date petition received: 1-29-01

☐ 90-day positive - FR date:

☐ 12-month warranted but precluded - FR date:

☐ Did the petition request a reclassification of a listed species?

FOR PETITIONED CANDIDATE SPECIES:

a. Is listing warranted (if yes, see summary of threats below)? yes

b. To date, has publication of a proposal to list been precluded by other higher priority listing actions? yes

c. If the answer to a. and b. is "yes", provide an explanation of why the action is precluded.

On January 29, 2001, the USFWS was petitioned to list the southern Idaho ground squirrel (Biodiversity Legal Foundation 2001). On October 30, 2001, the USFWS published a Candidate Notice of Review in the Federal Register designating the southern Idaho ground squirrel a candidate with a listing priority of 3 (66 FR 54810). We considered the assertions provided in the petition in making our previous petition findings for this subspecies. We find that the immediate issuance of a proposed rule and timely promulgation of a final rule for this species has been, for the preceding 12 months, and continues to be, precluded by higher priority listing actions (including candidate species with lower LPNs). During the past 12 months, almost our entire national listing budget has been consumed by work on various listing actions to comply with court orders and court-approved settlement agreements, meeting statutory deadlines for petition findings or listing determinations, emergency listing evaluations and determinations, and essential litigation-related, administrative, and program management tasks. We will continue to monitor the status of this species as new information becomes available. This review will determine if a change in status is warranted, including the need to make prompt use of emergency listing procedures. For information on listing actions taken

over the past 12 months, see the discussion of “Progress on Revising the Lists,” in the current CNOR which can be viewed on our Internet website (<http://endangered.fws.gov/>).

___ Listing priority change

Former LP: ___

New LP: ___

Date when the species first became a Candidate (as currently defined): 10-30-2001

___ Candidate removal: Former LPN: ___

___ A – Taxon is more abundant or widespread than previously believed or not subject to the degree of threats sufficient to warrant issuance of a proposed listing or continuance of candidate status.

___ U – Taxon not subject to the degree of threats sufficient to warrant issuance of a proposed listing or continuance of candidate status due, in part or totally, to conservation efforts that remove or reduce the threats to the species.

___ F – Range is no longer a U.S. territory.

___ I – Insufficient information exists on biological vulnerability and threats to support listing.

___ M – Taxon mistakenly included in past notice of review.

___ N – Taxon does not meet the Act’s definition of “species.”

___ X – Taxon believed to be extinct.

ANIMAL/PLANT GROUP AND FAMILY: Mammal (Sciuridae, squirrels)

HISTORICAL STATES/TERRITORIES/COUNTRIES OF OCCURRENCE: Idaho

CURRENT STATES/COUNTIES/TERRITORIES/COUNTRIES OF OCCURRENCE: Idaho/
Gem, Payette, Washington Counties

LAND OWNERSHIP:

From the population site data provided by Yensen (2000b) and Yensen and Haak (2000) during their survey work, 219 individual population sites were located using GPS equipment (not including the approximately 30 new population sites discovered in 2002). Of the 219 sites, 85 percent (186) were determined to be private lands (mostly ranches and farms), 12 percent (26) were under Federal management by the Bureau of Land Management (BLM), and 3 percent (7) were under management jurisdiction of the Idaho Department of Lands (IDL) (Kibler 2000).

The above ownership analysis is approximate however, because it was a macro-analysis and is subject to error. Under the landownership theme, tracts under 16 ha (40 ac) in size were omitted.

Therefore, some of the squirrel population locations may fall within one or more of these tracts and may cause discrepancies in the ownership analysis. Another factor to consider is that field locations of squirrels represent a single point or several points with a polygon. They do not reflect the home range of the squirrels living in a specific area, which may overlap several landowners/managers. This multiple landownership overlap is not reflected in the above data comparison. Presently, the BLM is working on GIS map attributes to update the land ownership status and provide a better estimate of the proportion of Federal/State/private lands within the

range of the southern Idaho ground squirrel (Joe Bucher, Bureau of Land Management (BLM), pers. comm. 2004). The updated GIS attributes will include the more than 75 new population sites that were found between 2000 and 2004 (Kibler 2000).

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LEAD FIELD OFFICE CONTACT: Snake River Fish and Wildlife Office, Carmen Thomas, 208-378-5243, carmen_thomas@fws.gov

BIOLOGICAL INFORMATION

Species Description

The southern Idaho ground squirrel is a relatively small member of the genus *Spermophilus*. Southern Idaho ground squirrels are about 235 to 241 mm (9 inches) long, with a short, narrow tail, tan feet and ears, and a grey-brown throat (Yensen 1991). This small-eared mammal differs from a similar subspecies, the northern Idaho ground squirrel, in pelage coloration. The southern Idaho ground squirrel lives on lower elevation, paler colored soils formed by granitic sands and clays from the Boise Mountains. The northern Idaho ground squirrel is found at higher elevation areas with shallow reddish parent soils of basaltic origin. Marked differences in pelage coloration are related to soil color, with the southern Idaho ground squirrel being noticeably paler (Yensen 1985, 1991).

Taxonomy

There are two distinct types of Idaho ground squirrels, and the current scientific nomenclature recognizes them as subspecies: the southern Idaho ground squirrel (*Spermophilus brunneus endemicus*) and the northern Idaho ground squirrel (*Spermophilus brunneus brunneus*) (Yensen 1991). Yensen (1991) thought that the two were close to species-level separation, and subsequent work has indicated that they could be validated as separate species (Gill and Yensen 1992, Gavin *et al.* 1999). The two ground squirrels are separated by differences in pelage coloration, pelage length and texture, cranial and external morphometrics, bacula, allelic frequencies, genetics, timing of the life history cycle, and behavior. The baculum of the southern Idaho ground squirrel is generally larger than its northern counterpart (Yensen 1991). Genetic differentiation between the two subspecies was confirmed using enzyme analyses and DNA protein sequencing, both of which analyze blood constituents to determine genetic differences (Gill and Yensen 1992).

Habitat/Life History

Southern Idaho ground squirrels are found in the lower elevation shrub/steppe habitat of the lower Weiser and Payette River basins. Their habitat is typified by rolling hills, basins, and flats composed of lacustrine and fluvial sediments between 670 to 975 meters (2,200-3,200 feet) elevation. They inhabit an area once dominated by big sagebrush (*Artemisia tridentata*), bitterbrush (*Purshia tridentata*), and a variety of native forbs and bunchgrasses (Yensen 1991).

Prescott and Yensen (1999) suggested that these squirrels prefer areas with a high percentage of native cover types, especially areas with big sage; however, some nonnative features may enhance their survival as well, specifically alfalfa fields, haystacks or fence lines. The predominant vegetation was formerly big sagebrush-bunchgrass-forb associations, with bitterbrush found in the sandier locations (Yensen 2000b). The big sagebrush-bunch grass-forb complex has dramatically changed so that most of the former vegetative structure has been replaced by exotic annuals.

The southern Idaho ground squirrel spends much of its time underground. Adults emerge from seasonal torpor in late January or early February, depending on elevation and micro-habitat conditions (Yensen and Sherman 1997). As with other small-eared ground squirrels in the northwest, the adults have a short active season above ground of 4 to 5 months, which is spent reproducing and foraging before the long seasonal torpor begins (Moroz *et al.* 1995, Yensen and Sherman 1997, Sherman 2000). Females are bred within the first few days of emerging from torpor. Young are born about 3 weeks later and emerge from the nest burrow in about 50 days. Adult males are the first to begin torpor and typically cease above ground activity by late June. Adult females and juveniles typically remain above ground longer; all age groups generally cease above ground activity by late July to begin torpor.

A high quality diet of green vegetation and seeds is required to store enough fat to survive long months of torpor. Though dietary requirements of the southern Idaho ground squirrel have not been studied extensively (Yensen and Sherman 1997), they are likely to be similar to those of other ground squirrels in Idaho (Dyni and Yensen 1996). Southern Idaho ground squirrels are thought to prefer a selection of native species of perennial grasses and forbs that provide a reliable source of nutritious forage (Yensen 1999, Prescott and Yensen 1999). However, in a recent study of southern Idaho ground squirrel diets at five locations, Tarifa and Yensen (2004) determined that diets were comprised primarily of exotic grasses, or of exotic and native forbs. Native grasses were absent from the diets. No relationship was found between the abundance of a species in the diet and its abundance in the habitat (Tarifa and Yensen 2004). The number of species in the diet of southern Idaho ground squirrel increased throughout the course of the season. Green leaves predominated southern Idaho ground squirrel diets early in the season, and seeds were dominant in southern Idaho ground squirrel diets late in the season (Tarifa and Yensen 2004). This pattern generally follows the phenology of the available vegetation.

Historical Range/Distribution

As of 2001, the known range of the southern Idaho ground squirrel occurred within an approximately 209,628 hectare (ha) or 518,000 acre (ac) area extending from Emmett, Idaho, northwest to Weiser, Idaho and the surrounding area of Squaw Butte, Midvale Hill and Henley Basin in Gem, Payette, and Washington counties (Yensen 1991). Its range was bounded on the south by the Payette River, on the west by the Snake River, and on the northeast by lava flows with little soil development (Yensen 1991).

Beginning in the spring of 2001, Yensen and staff from the Idaho Department of Fish and Game (IDFG), conducted several monitoring surveys of southern Idaho ground squirrels. The 2001

survey “discovered” a total of 76 new sites which brought the total known sites to 295 (Yensen and Haak 2001). Survey results indicated that Gem County had the largest remaining populations, followed by Payette County and Washington County.

The range of southern Idaho ground squirrels formerly extended further north to the town of Goodrich, Idaho in Adams County (Yensen 1980, 1991). However, studies have shown a severe contraction in the number of occupied population sites in the northern part of their range. For example, the only known historical site in Adams County was not occupied in 1999 (Yensen 1999, 2000a), and southern Idaho ground squirrels may currently be extinct in Adams County (Yensen 2001).

Current Range/Distribution

Based on recent surveys, the southern Idaho ground squirrel occurs in an area about 61 kilometers (km) x 61 km (38 x 38 miles (mi)) extending from Emmett, Idaho, northwest to Weiser, Idaho and the surrounding area of Squaw Butte, Midvale Hill, and Henley Basin in Gem, Payette and Washington Counties (Yensen 1991, 2001; Haak 2003). Its range is bounded on the south by the Payette River, on the west by the Snake River and on the northeast by lava flows with little soil development (Yensen 1991, 2001).

In 2004, the USFWS contracted with the IDFG to survey privately-held lands within the known range of southern Idaho ground squirrels to determine their distribution. This survey work was conducted in conjunction with a candidate conservation agreement with assurances (programmatic CCAA) that the USFWS was developing for southern Idaho ground squirrels. Surveyors obtained permission from the landowners prior to surveying each of their lands. These surveys resulted in the location of a number of new occupied locations for southern Idaho ground squirrels. Approximately 5 new locations were identified in Washington County, 24 new locations were identified in Payette County, and 19 new locations were identified in Gem County, all on private land that had not been previously surveyed. This information is currently being used to develop site-specific plans for southern Idaho ground squirrels (please see Conservation Measures Planned or Implemented section below). These surveys continued in 2005, with the emphasis remaining on private lands likely to be enrolled in the programmatic CCAA. Approximately 71 locations were identified, some of which overlap with locations identified in 2004.

In 2004 and 2005, BLM surveyed approximately 1,214 ha (3,000 ac) of their lands to better refine their understanding of the current range/distribution of southern Idaho ground squirrels. Surveys were conducted in May and June in both years. In 2004, new locations of southern Idaho ground squirrel colonies were identified along Little Willow Creek, Sheep Gulch, Big Willow Creek and its tributaries, in the Sand Hollow drainage, Haw Creek, Yergenson Creek, and Squaw Creek (J. Holderman, in litt. 2004). In 2005, previously unknown ground squirrel locations were identified east of Squaw Butte and north of Sucker Creek (Jill Holderman, BLM, pers comm. 2005).

Currently, the distribution of the species is patchy, with areas of localized abundance and large areas of apparently suitable habitat that are unoccupied, or are sparsely occupied. The areas of localized abundance are typically concentrated around human-altered landscapes such as golf courses and row crop or farmed fields (particularly alfalfa and clover). The surveys described above will likely continue while funding is available because the BLM, IDFG, and USFWS all agree that we have incomplete knowledge of the distribution of this species. The emerging trend that may be derived from the surveys conducted to date is that the distribution of the southern Idaho ground squirrels has shifted from the northwest portion of its range (where it was regularly detected during surveys in the late 1990's) to the southeast portion of its range (where most recent sightings have been). Due to the difference in coverage provided by the early (mid 1980s and late 1990s) and more recent surveys (post 2002), this trend may be an artifact. Regardless of whether the trend is real, the reason for this shift in distribution is unknown.

Population Estimates/Status

The population of southern Idaho ground squirrels was estimated at around 40,000 in 1985 (Yensen 1985), although Yensen (2001) himself believes this estimate may have been 2 to 10 times too high. Surveys indicate a persistent decline in the ground squirrel population at known sites since the mid 1980s (Yensen 1999, 2001). A 1999 survey of 145 of the 180 known historical population sites indicated that only 53 sites (37 percent) were still occupied (Yensen 1999). The percentage of active sites for southern Idaho ground squirrels also decreased from south to north. Fifty-eight percent of the sites in Gem County still had squirrels (Yensen 1999). The percentage dropped to 46 percent in Payette County and decreased to 27 percent of the sites in Washington County. Ground squirrels were seen at only 19 of the occupied sites despite 28 person-days of surveys of 145 sites. Furthermore, at 18 of the occupied sites only a single individual was seen, fecal pellets were found at 13 sites, and vocalizations were heard at only one site.

During 2000, Yensen (2000b) surveyed the 35 remaining sites not surveyed in 1999. Active burrows were found at only one of the 35 sites, but southern Idaho ground squirrels were not observed. The Idaho Department of Fish and Game (IDFG) was contracted from March to June, 2000, to search 93 exchange parcels of Bureau of Land Management (BLM) lands, and about 77 square km² (30 square mi²) of contiguous rangeland for southern Idaho ground squirrels (Yensen and Haak 2000). The survey produced 30 new southern Idaho ground squirrel population sites. By the end of the 2000 survey season, a total of 219 sites were known. Squirrel numbers were low at all surveyed sites that were found to be active. A GIS analysis of information recorded for the 219 sites found that 44 percent (98) were active sites; activity was not confirmed or remained undetermined at the other 56 percent (121) population site locations (Kibler 2000). For comparison, in the early 1980s, several thousand individuals would likely have been observed during a survey throughout the range of southern Idaho ground squirrel (Yensen 2000b).

Beginning in the spring of 2001, Yensen and staff from IDFG conducted several monitoring surveys of southern Idaho ground squirrels (Yensen 2001). Survey results indicated that Gem County had the largest remaining populations, followed by Payette County and Washington

County. Total occupancy was estimated at 622 km² (240 mi²) and population densities were estimated at 3.5 to 7.0 adult squirrels/ km². This gave a total estimate of 2,177 to 4,354 southern Idaho ground squirrels (Yensen 2001).

Results from southern Idaho ground squirrel surveys conducted by IDFG in 2002 and 2003 located 20 and 25 new, active population sites (Haak 2002, 2003). In addition, surveys conducted along 40 km (25 mi) of existing Idaho Power Company transmission line rights-of-way located 30 active population sites (Carpenter and Dumas 2003).

Also in 2004, the USFWS obtained permission to survey the Scotch Pines Golf Course (Payette, Idaho) for southern Idaho ground squirrels. The golf course is public and surrounded by farmland. Although intensive trapping was not conducted to obtain an accurate population estimate, visual surveys indicated a substantial population of ground squirrels occur at this location. Surveyors observed 94 animals during one 4.5-hour session conducted in early March; surveyors later observed 256 animals (adults and pups combined) during an 8-hour session in May. Populations of southern Idaho ground squirrels were so numerous at this site in 2005 that golf course managers requested the removal of a number of animals. Staff from the USFWS and IDFG responded and conducted a trap-and-removal effort in May. During an intensive 2-day trapping effort, approximately 150 southern Idaho ground squirrels were captured at the golf course and translocated to suitable habitat on BLM lands.

Preliminary results from the intensive trapping conducted in 2005 (see Description of Monitoring section below) provide the following population estimates (Table 1). Methods for using these numbers to extrapolate the population estimates to a larger area are currently under development (Carmen Thomas, USFWS, pers. comm. 2005).

Table 1. Estimated numbers of females and males at selected intensive trapping sites for southern Idaho ground squirrels in 2005 (J. Barrett, IDFG, in litt. 2005).			
Site	Number of Females	Number of Males	Total
Bissel 1	28	15	43
Clay Peak	9	19	28
Holland Gulch	13	13	26
Squaw Butte	25	7	32
Sand Hollow	10	11	21

These numbers were derived from trapping results using the Chapman-modified Lincoln-Peterson technique (Pollock *et al.* 1990).

THREATS

A. The present or threatened destruction, modification, or curtailment of its habitat or range.

Habitat deterioration appears to be a leading factor affecting the long-term persistence of southern Idaho ground squirrels (Yensen 1999). In recent decades, invasion of exotic annuals has changed the species composition of vegetation and has altered the fire regime in a

perpetuating cycle throughout much of the range of these squirrels (Whisenant 1990). Cheatgrass (*Bromus tectorum*) and medusahead (*Taeniatherium asperum*) are of limited forage value to the squirrels, have highly variable annual productivity, and now dominate much of the squirrels' range (Yensen *et al.* 1992, Yensen 1999). Diversity of native forbs and grasses decreases where these exotics take over, and exotic species are believed to limit the dietary diversity available to ground squirrels (Yensen 1999, Tarifa and Yensen 2004). Without the reliable and nutritious diet provided by native grasses and forbs, these squirrels are left with the highly variable productivity and nutritional value of exotic annuals. In years of low rainfall, low productivity of these exotics could prevent squirrels from storing enough fat to overwinter. Yensen *et al.* (1992) showed that local populations of Paiute ground squirrels (*Spermophilus mollis*) were highly unstable and prone to extinction in local areas that were invaded by exotic annuals.

B. Overutilization for commercial, recreational, scientific, or educational purposes.

At one time, recreational shooting of ground squirrels was common and likely had a detrimental effect on populations of southern Idaho ground squirrels in some areas. Evidence of recreational shooting was found at a southern Idaho ground squirrel population site where squirrel activity ceased (Yensen 1999). The Rolling Hills golf course was an area where control activities were implemented each year in an attempt to exterminate the squirrels (Yensen 1999; Bruce Haak, IDFG, pers. comm. 2000). However, since 2002, other measures (translocations) have been taken to control ground squirrels at the golf course (Haak 2002); these translocations were successful at reducing the population of southern Idaho ground squirrels there.

The IDFG recognizes the southern Idaho ground squirrel as a "Species of Special Concern" (IDFG 1994). Under State law, such species are protected from taking (shooting, trapping, poisoning) or possession. Before 2003, there was no public awareness or enforcement program being implemented. In 2003, the IDFG initiated a public awareness program through including a one-page notice in their Upland Gamebird regulations booklet warning against shooting of the squirrel, and since 2004 by distributing and posting "Don't Shoot" posters (Bruce Haak, pers. comm. 2004). This poster campaign has yet to be evaluated for its effectiveness with regards to reduced shooting of southern Idaho ground squirrels. While an undetermined number of southern Idaho ground squirrels have been collected during a 30-year period for scientific and taxonomic study, scientific collection is not considered a significant factor in their overall decline (Moroz *et al.* 1995).

C. Disease or predation.

Disease has been suggested as potentially contributing to the decline of southern Idaho ground squirrels (Prescott and Yensen 1999, Yensen 1999), though no epizootic infestation has been noticed in either subspecies of Idaho ground squirrel (Yensen *et al.* 1996, Yensen and Sherman 1997). Blood analyses to determine whether pandemic diseases are present have not been done but should be considered in the future. Plague (*Yersinia pestis*), a contagious bacterial disease found in rodents, has not been identified in southern Idaho ground squirrels (Yensen *et al.*

1996). The disease is of particular concern however, since once established, it could decimate the remaining numbers of squirrels throughout their range.

Predation has not been suggested as a factor affecting the southern Idaho ground squirrels; however, predators can have a severe impact on prey populations that occur at critically low numbers. As with northern Idaho ground squirrels, one can assume that southern Idaho ground squirrels are preyed upon by many species including the red-tailed hawk (*Buteo jamaicensis*), prairie falcon (*Falco mexicanus*), northern harrier (*Circus cyaneus*), badger (*Taxidea taxus*), long-tailed weasel (*Mustela frenata*), and gopher snake (*Pituophis melanoleucus*) (Yensen and Sherman 1997). Although not documented, domestic cat (*Felix catus*) predation could be significant at some population sites that are found near ranch houses or along the fringe of urban areas.

D. The inadequacy of existing regulatory mechanisms.

Currently, the southern Idaho ground squirrel is not protected by federal or local laws. The International Union for Conservation of Nature classified the southern Idaho ground squirrel as “vulnerable” (Hafner *et al.* 1998). The IDFG classified the southern Idaho ground squirrel as a “Species of Special Concern” in 1981, meaning that the subspecies is protected by State law from taking (shooting, trapping, poisoning) or possession. Prior to 2000, there was little concern for the protection of southern Idaho ground squirrels. However, since 2002, protection from recreational shooting or poisoning is being elevated through information and education provided to agencies and the public, and through discussions with State and Federal agencies including Idaho Department of Lands (IDL), BLM, and the Animal Plant Protection Service (APHIS - Wildlife Services).

Intensive survey and outreach efforts began in 2000. Since then, private landowners have become generally aware of the status of this subspecies. Some have been very cooperative in allowing surveys and posting “Don’t Shoot” signs on their lands. One private company took the initiative to begin active southern Idaho ground squirrel conservation management through a Candidate Conservation Agreement with Assurances (CCAA) with the USFWS (Soulen Livestock *et al.* 2002). The CCAA, approved in 2002, covers southern Idaho ground squirrel conservation on approximately 17,402 ha (43,000 ac), and requires implementation of a number of conservation measures (Soulen Livestock *et al.* 2002). In March 2005, the USFWS and IDFG completed a programmatic CCAA covering all private land within the historical range of the subspecies. Under this programmatic CCAA, private landowners can enroll in the CCAA if they are willing to implement certain conservation measures on their property for the southern Idaho ground squirrel (IDFG *et al.* 2005). There are a number of private landowners who are interested in signing site specific plans under this programmatic CCAA. The USFWS anticipates enrolling at least four landowners by the end of the 2005 calendar year.

Before 2000, little or no regulatory consideration was given to southern Idaho ground squirrels by BLM. The BLM now includes southern Idaho ground squirrel conservation measures in their Resource and Fire Management Plan updates for the Weiser Basin (Jill Holderman, BLM, pers. comm. 2004). The BLM also has provided funding for population surveys from 2000 to 2005 on

BLM lands through its Challenge Cost Share Program (Yensen 2000b; Yensen and Haak 2000; Haak 2002; Warner 2003; Jill Holderman, BLM, pers. comm. 2005). Additionally, the BLM and Idaho Power Company (IPC) began a prototype habitat restoration study in 2002 for the southern Idaho ground squirrel (Jack LaRocco, BLM, pers. comm. 2000; Jill Holderman, BLM, pers. comm. 2002). This study included various herbicide treatments to reduce the occurrence of nonnative plants and subsequent seeding of these areas with native material.

The USFWS has made federal agencies aware of the status of the southern Idaho ground squirrel. The USFWS also provided significant comments to the Environmental Protection Agency (EPA) concerning the use of zinc phosphide, a chemical used to control rodents on public lands. This resulted in the chemical being subject to conditions and restrictions in those counties where the southern Idaho ground squirrel is found (J. Jones, EPA, in litt. 2000). Other regulatory threats to the subspecies may include the control of grasshopper and mormon cricket infestations by the BLM and Natural Resources Conservation Service (NRCS) through the application of chemicals. Steps have been taken to elevate awareness and review National Environmental Policy Act documents where control programs are being considered (Susan Burch, USFWS, pers. comm. 2004).

The USFWS has also made State agencies aware of the population status of the southern Idaho ground squirrel. However, there is no requirement for a State agency to conference with the USFWS for an unlisted or candidate species.

E. Other natural or manmade factors affecting its continued existence.

Ground squirrels are considered to be pests by many farmers and ranchers (Prescott and Yensen 1999). When available, alfalfa crops are one of the preferred food sources for southern Idaho ground squirrels, resulting in localized crop losses during years of high squirrel populations (Prescott and Yensen 1999). Yensen (1998) suggested that use of pesticides associated with crop production and insect infestation may have played a role in the historical decline of this subspecies. Badgers are often attracted to population sites of ground squirrels, where they dig large holes in the ground that can be dangerous to livestock (Prescott and Yensen 1999). Efforts to control ground squirrel populations are frequently undertaken regardless of species or subspecies and most often include shooting or poisoning. Control efforts can adversely affect populations of southern Idaho ground squirrels (Yensen 1998, 2000a; Prescott and Yensen 1999). APHIS-Wildlife Services has been made aware of our concerns and coordinates their control work of rodents to avoid control programs in the vicinity of southern Idaho ground squirrels.

Competition with Columbian ground squirrels (*Spermophilus columbianus*) may constitute a threat to the continued existence of southern Idaho ground squirrels. The restricted range of Idaho ground squirrels occurs within the much wider range of the Columbian ground squirrel, and they occur sympatrically in some localities (Dyni and Yensen 1996). Southern Idaho ground squirrels are limited by interspecific competition with Columbian ground squirrels (Moroz *et al.* 1995, Yensen and Sherman 1997, Haak 2000), including competition for burrow sites (Haak 2000) and for food resources (Dyni and Yensen 1996). Where the two species occur

sympatrically, Columbian ground squirrels occupy the more productive, mesic habitat with deeper soils (Yensen 1980, Dyni and Yensen 1996, Haak 2000).

The population site containing the greatest known number of southern Idaho ground squirrels is currently located at the Scotch Pines Golf Course in Payette, Idaho. Prior to about 2001, the golf course managers sterilized the roughs to reduce the required amount of maintenance. Golf course managers do not recall seeing many ground squirrels during this time. Since seeding the roughs in the early 2000s, the vegetation has become well established and currently supports dense populations of southern Idaho ground squirrels. In 2004, golf course managers received numerous complaints from players and staff about lost golf balls and other issues resulting from ground squirrel activity. To reduce the populations in two areas, the USFWS and IDFG trapped and removed approximately 150 southern Idaho ground squirrels. All animals were released in suitable habitat on BLM lands. The golf course does not have a conservation agreement with the USFWS, and has been considering sterilizing the roughs once again to eliminate their perceived problem with southern Idaho ground squirrels. Currently there are no prohibitions against sterilizing the roughs; the State prohibition only applies to shooting, trapping, and poisoning. If the golf course managers do sterilize the roughs, it will result in a significant lost opportunity to use the golf course as a 'source' of animals with which to repopulate their native habitats. Additional trap and translocation efforts are needed to restore the species to its historical distribution in the shrub steppe habitats.

Habitat destruction and fragmentation have resulted in a distribution of relatively isolated population sites of southern Idaho ground squirrels. Isolation of these small populations may play a role in the decline of this subspecies. Small, isolated populations are more susceptible to natural disasters, catastrophic invasions of predators, parasites, or diseases, and suffer from loss of viability associated with genetic drift and inbreeding (Moroz *et al.* 1995, Gavin *et al.* 1999, Garner 2004). Genetic mitigation of small populations often can become a balancing act between maintaining genetic diversity and safeguarding unique local adaptations. Southern Idaho ground squirrels exhibit relatively low levels of microsatellite diversity, high levels of divergence among isolated populations, and low divergence among other populations (Garner 2004). Garner (2004) recommended translocation or supplementation of existing populations with captive-bred squirrels of known sources that have been genetically fingerprinted. Also, she recommended a low-level exchange of individuals between wild populations in sub-regional areas to increase genetic diversity but maintain unique local adaptations. The USFWS, IDFG, BLM, and researchers from Boise State University and Albertson College of Idaho began implementing these recommendations in 2005 with the ground squirrels translocated from the Scotch Pines Golf Course (see previous discussion).

Many of the remaining southern Idaho ground squirrel habitats and associated population sites are vulnerable to one or more man-made and naturally occurring threats. The persistence of invasive exotic plants and associated changes in fire frequency has made much of their remaining habitat less suitable. The low number of squirrels observed at many of the known population sites increases the risk of extirpation. However, increased interest in this subspecies due to recent cooperative monitoring and survey efforts, habitat reclamation and restoration plans under development by the BLM, and the implementation of a single landowner

conservation agreement and a programmatic conservation agreement for other private landowners, is encouraging. There still are threat factors that may act singly, in combination, or synergistically to affect population numbers, productivity and induce genetic isolation and drift.

CONSERVATION MEASURES PLANNED OR IMPLEMENTED

The USFWS has supported four range-wide population surveys of southern Idaho ground squirrels during the past 20 years. The information from these surveys, additional data collected from annual monitoring since 2000, and information from the petition form the basis on which the USFWS initiated a Candidate Species Form. The BLM, in cooperation with the IDFG, initiated a survey for squirrels on BLM-managed lands in the summer of 2000 and 2001 to determine the location of active population sites of squirrels. The Idaho Power Company initiated a habitat reclamation study plan in cooperation with BLM at one population site (Clay Peak). The results of this study can be applied to other sites being considered for habitat reclamation. The USFWS co-sponsored a symposium with other agencies and Albertson College on the Conservation Biology of Ground Squirrels and the Shrub-Steppe Ecosystem on March 30, 2001.

In 2002, a candidate conservation agreement with assurances (CCAA) was approved with the Soulen Livestock Company that provides for southern Idaho ground squirrel habitat conservation on approximately 43,000 ac (17,402 ha). A total of 125 squirrels were trapped and removed from the Rolling Hills Golf Course (59 in 2001 and 66 in 2002) and translocated to private property owned by the Soulen Livestock Company and enrolled in the CCAA. Population monitoring of this translocated population indicates that about 30 to 50 percent of the population survived the translocation through 2002. Reproduction within population was verified in the summer of 2002, although the longevity of this transplanted population is uncertain. Follow-up surveys conducted in 2005 failed to detect any ground squirrel presence at these translocation sites, and surveyors concluded that the site is no longer occupied (Yensen 2005).

In 2002 as part of the CCAA, the USFWS underwrote southern Idaho ground squirrel surveys for six years on the Soulen Livestock Company lands. Nine new southern Idaho ground squirrel population sites were found during the 2003 survey (Yensen 2003). The 2004 survey failed to detect any new population sites at or near Cinnabar Ranch (Yensen 2004). Work in 2004 also focused on documenting the relatively large southern Idaho ground squirrel population in the Road Gulch and adjacent Dry Creek Road areas. Although no new southern Idaho ground squirrel populations were detected in 2005, a number of potentially suitable locations for translocating/reestablishing southern Idaho ground squirrel were identified (Yensen 2005). The population at Road Gulch/Dry Creek was revisited and the population seemed comparable to that detected in 2004. In addition, the release sites used in 2001 and 2002 were revisited; no evidence of southern Idaho ground squirrel was detected (Yensen 2005).

Several private landowners are cooperating in allowing studies of southern Idaho ground squirrels to be conducted on their lands. Since 2002, a total of four graduate students have conducted thesis work on southern Idaho ground squirrels. One student completed her master of science thesis at the University of Idaho in April of 2004, on the conservation genetics on Idaho

ground squirrels (Garner 2004). One student completed her master of science thesis at Boise State University in early 2005, on methods of translocating southern Idaho ground squirrels. Two other graduate students from Boise State University are due to finish in the fall of 2005 (demographic study), and the fall of 2006 (microhabitat characteristics study). The USFWS provided substantial monies to support the studies of all four graduate students.

The USFWS, IDFG, and Office of Species Conservation, a branch of the Governor's office completed and signed a programmatic CCAA covering all non-Federal land within the historical range of the subspecies (approximately 425,630 ha or 1,051,752 acres). Under this programmatic CCAA, private landowners can enroll in the CCAA if they are willing to implement certain conservation measures on their property (IDFG *et al.* 2005). In 2004 and 2005, the USFWS provided funding to IDFG to hire a biotechnician to survey private lands where landowners have indicated they may participate in the programmatic CCAA. Final results from this survey effort are on file at the USFWS and IDFG offices. Long-term monitoring sites were also established in 2005, to ensure repeatability of future efforts. We currently have draft site-specific plans for five landowners that are interested in participating in the programmatic CCAA. If all five landowners enroll, approximately 21,044 ha (52,000 ac) will be enrolled under the programmatic CCAA.

SUMMARY OF THREATS

Threats to southern Idaho ground squirrels include: habitat deterioration and fragmentation, direct killing from shooting, trapping or poisoning, predation, competition with Columbian ground squirrels, and inadequacy of existing regulatory mechanisms. Habitat deterioration appears to be the primary threat to southern Idaho ground squirrel (Yensen 1999). Nonnative annuals now dominate much of this species' range, have changed the species composition of vegetation, and have altered the fire regime in a perpetuating cycle throughout much of the range of these squirrels (Whisenant 1990). While southern Idaho ground squirrel feed on green shoots of cheatgrass and this grass may represent a significant portion of their diet in the early season, cheatgrass and medusahead rye have highly variable annual productivity (Yensen 1999, Yensen *et al.* 1992). In years of low rainfall, low productivity of these exotics could prevent squirrels from storing enough fat to overwinter and result in significant overwinter mortality across large portions of their range. Yensen *et al.* (1992) showed that populations of Pauite ground squirrels (*Spermophilus mollis*) were highly unstable and prone to extinction in areas invaded by exotic annuals. Habitat degradation and fragmentation are likely the primary or proximal causes of the current patchy distribution of southern Idaho ground squirrels. Once populations are isolated, adverse effects of genetic drift and inbreeding occur which further depress pops. Based on recent genetics work, southern Idaho ground squirrels are subject to more genetic drift and inbreeding than expected (Garner 2004).

Recreational shooting and other direct killing of southern Idaho ground squirrels is common and is likely the current secondary threat to southern Idaho ground squirrels, although no studies have been conducted to determine the specific effects on ground squirrel populations. Ground squirrels are sometimes considered pests by farmers and ranchers (Prescott and Yensen 1999). When available, alfalfa and clover crops are one of the preferred food sources for southern Idaho

ground squirrel, resulting in localized crop losses in localized areas of abundance. Efforts to control ground squirrel populations are frequently undertaken regardless of species and most often include shooting or poisoning. Control efforts can adversely affect populations of southern Idaho ground squirrel (Yensen 1998, Prescott and Yensen 1999, Yensen 2000a). Although a disease outbreak could have significant impacts on the remaining populations of southern Idaho ground squirrel, there has been no evidence of disease and this threat factor is not imminent at this time.

Predation is always present as threat factor but likely to impact populations only in situations in which populations are already isolated and/or depressed. Competition with Columbian ground squirrels is also a threat to certain populations but currently not a threat across the range of the species.

The primary threats to southern Idaho ground squirrels are still imminent and widespread. Thus the status of the species as a candidate for listing remains unchanged. It should be noted that there are a number of activities (ongoing and developing) that either do, or will, provide some degree of amelioration. The Soulen CCAA was completed in 2002 and the programmatic CCAA was completed in 2005. Both CCAAs provide additional protection to southern Idaho ground squirrel from recreational shooting and other direct killing, and also allow the agencies (USFWS, IDFG, OSC) to investigate ways of restoring currently degraded habitat.

RECOMMENDED CONSERVATION MEASURES

Based on the information currently available on southern Idaho ground squirrels, and the work either completed or in progress, we recommend the following conservation measures.

1. Fully implement the programmatic Candidate Conservation Agreement with Assurances (CCAA) completed in 2005 (IDFG *et al.* 2005). Since this CCAA covers the entire known range of the species and was designed for private lands on which the predominant use is agriculture (farming or ranching), it is a valuable tool for squirrel conservation. We further recommend that the focus of implementation of current site-specific plans (*e.g.*, the five plans near completion) remain on habitat improvements. This focus will decrease what is currently seen as the primary threat to the species. Additional work is also needed to survey lands and to assess population and habitat status, and continued outreach and education efforts are needed to further reduce direct mortality from shooting/poisoning.
2. Actively recruit additional landowners to participate in the CCAA. In addition to fully implementing existing site-specific plans, we recommend actively recruiting additional landowners to enroll in the CCAA. Increasing the area of land covered by the CCAA, and protected for ground squirrels, will further reduce threats.
3. Pursue other CCAAs. The programmatic CCAA was designed primarily for private lands used primarily for agriculture (farming or ranching). Other potential uses, such as golf courses, city parks, or utility corridors were not the primary target of the

programmatic CCAA. Depending upon the situation, different conservation actions/commitments may be needed for these lands. In addition, we are aware of one situation in Payette County that would be a good candidate for a CCAA that we will be pursuing in FY2006. The BLM is in the process of transferring a parcel of land which supports southern Idaho ground squirrels to Payette County. The County plans on developing portions of the parcel. We have initiated discussions with both the BLM and County about this parcel about how to minimize impacts to ground squirrels and include their conservation in the Master Plan for the site.

4. Continue to work cooperatively with the BLM on surveys and habitat enhancement/restoration measures. In 2004 and 2005, the BLM conducted surveys for southern Idaho ground squirrels on parcels of their lands not previously surveyed for this species. The BLM is actively attempting to compile a comprehensive database of locations for this species. They also allocated limited funds in FY05 to be used for habitat restoration for ground squirrels. By partnering with the BLM on their survey effort, we will increase the area covered and thereby reduce the amount of time required to achieve a comprehensive database of ground squirrel locations on federal land. By partnering with BLM on their habitat enhancement/restoration activities, we may be able to leverage limited funds to achieve larger or longer lasting results.

LISTING PRIORITY

THREAT			
Magnitude	Immediacy	Taxonomy	Priority
High	Imminent	Monotypic genus	1
		Species	2
		Subspecies/population	3
	Non-imminent	Monotypic genus	4
		Species	5
		Subspecies/population	6
Moderate to Low	Imminent	Monotypic genus	7
		Species	8
		Subspecies/population	9
	Non-imminent	Monotypic genus	10
		Species	11
		Subspecies/population	12

Rationale for listing priority number:

Magnitude:

The magnitude of threat has diminished since surveys were initiated in 1999, due to the discovery of previously unknown active population sites. Surveys for additional sites continue to find active new population sites. Even though habitat degradation is pervasive in throughout the range of this subspecies, suitable habitat areas that can support southern Idaho ground squirrels still persist. Conservation and habitat rehabilitation actions have begun in some areas. In 2001 and 2002, over 100 squirrels were captured from the Weiser Golf Course and translocated to suitable habitat on lands covered by a Candidate Conservation Agreement with Assurances (CCAA). In 2003, translocation of squirrels propagated at Zoo Boise was initiated. Studies were continued in 2004 and 2005 to learn how best to optimize translocations (Panek 2005), to improve genetic diversity among and between sub-regional populations (Garner 2004), to understand demographics (Barrett 2004), and to understand microhabitat characteristics (Ross 2004). A programmatic CCAA was completed in 2005 that covers all private lands within the known range of the species. Five landowners with a total of approximately 21,044 ha (52,000 ac) are interested in participating and have draft site-specific plans. These landowners have not yet enrolled in the programmatic CCAA, but we are hoping that they will do so by the end of the 2005 calendar year. These actions, in combination with other conservation and research actions described above, lead us to conclude that the magnitude of threats is moderate.

Imminence:

Threats from habitat degradation are ongoing and many of the remaining southern Idaho ground squirrel habitats and associated population sites are vulnerable to one or more man-made and naturally occurring threats. The persistence of invasive exotic plants and associated changes in fire frequency has made much of their remaining habitat less suitable. The low number of squirrels observed at many of the known population sites increases the risk of extirpation. Although provisions for habitat enhancement/restoration were included in the programmatic CCAA, plans for implementation of these measures are still under development. Thus, results from these efforts are at least a few years away. These threats to the southern Idaho ground squirrel are ongoing and, therefore, are imminent.

Yes Have you promptly reviewed all of the information received regarding the species for the purpose of determining whether emergency listing is needed?

Is Emergency Listing Warranted? No. Annual surveys and monitoring conducted since 2000 have found over 75 new additional southern Idaho ground squirrel population sites, and the USFWS expanded and revised the initial historical range. State and private landowners are willing participants in allowing intensive studies to be conducted on their lands and several Federal agencies, BLM, APHIS-WS, and NRCS are cooperators towards implementing conservation measures including habitat restoration. Due to studies and the work of cooperating partners, the USFWS is in a position to implement long-term recovery and habitat restoration efforts. The USFWS concludes that emergency listing of this subspecies is not warranted at this time.

DESCRIPTION OF MONITORING

Intensive and extensive monitoring of southern Idaho ground squirrels has been an ongoing annual event since the spring of 2000. Monitoring includes trapping, weighing, ear-tag marking and conducting local population counts by staff from IDFG and supported through section 6 funds.

Integrated into the above projects has been cooperation with BLM supervisors, biologists and GIS specialists. Within the NRCS's Environmental Quality Incentives Program (EQIP), funds were made available in 2004 to qualified private landowners for habitat improvements for 20 species at risk in Idaho. The southern Idaho ground squirrel was included in the list (Frank Fink, NRCS, pers. comm. 2004). Through the Partners Program administered by USFWS biologists, a private landowner entered into a cooperative agreement in 2004 to cost-share on improving 20 ha (50 ac) of wildlife habitat with emphasis on southern Idaho ground squirrels (Dennis Mackey, USFWS, pers. comm. 2004). Private landowners have provided permission to the IDFG and USFWS to survey, monitor and translocate squirrels on their lands. Golf course managers have allowed us to survey squirrel populations. Idaho Power Company ecologists have met numerous times with USFWS staff to coordinate surveys and habitat rehabilitation studies. Concerned staff from IDL and Idaho Department of Transportation have met with USFWS biologists during the past several years to better understand our conservation approach and to integrate it into their activities.

All of the above work on this subspecies has required monthly and sometimes weekly contact by USFWS biologists with various agency and university personnel. This level of monitoring and the intensity of work is providing the USFWS, other agencies, and corporate and private stakeholders an increased understanding of southern Idaho ground squirrels and the habitat upon which they depend. It has provided opportunities for the USFWS to establish a positive rapport with other Federal and State agency personnel and particularly to build trust with private landowners.

GIS is being used extensively to store survey and monitoring data, create and integrate maps, and to update status information about the southern Idaho ground squirrel. Updated comprehensive GIS maps on demography, habitat and landownership are being prepared by BLM for interagency, student, and private landowner applications (Joe Bucher, BLM, pers. comm. 2004). An interagency 5-year habitat reclamation study was initiated in 2002. Experimental vegetation plots (10 acres/plot for six plots) have been planted and monitoring began in 2003. The habitat reclamation studies will provide key information to be applied on BLM lands after range fire events to optimize seed mixtures of shrubs, forbs, and grasses that will favor forage and cover habitat for ground squirrels and have a multiplier effect for a diversity of other native species. Annual results from this study were still pending as of June 2004 (Jill Holderman, BLM, pers. comm. 2004).

Beginning in 2002, the USFWS provided substantial monies for four separate graduate studies at Boise State University and University of Idaho. Two master degree graduate students began studies on the demography, dispersal, and habitat use of southern Idaho ground squirrels in 2002,

and 2003, respectively (Barrett 2004, Panek 2005). A third master degree student completed genetics sampling of over 600 squirrels and successfully defended her thesis in April of 2004 (Garner 2004). A fourth graduate student initiated field studies in 2004, to examine microhabitat features and variables as to how they influence site selection, physiology, and survival rates of southern Idaho ground squirrels (Ross 2004).

In cooperation with the USFWS, IDFG, and Boise State University, Zoo Boise built a propagation/research/and educational live exhibit for southern Idaho ground squirrels. A total of 31 southern Idaho ground squirrels were trapped from the Rolling Hills Golf Course and from several other population sites in 2002 and translocated to Zoo Boise to begin a propagation and education program. This program proved to be a success with 24 young produced in the spring of 2003 (Panek 2003). The effort to captively breed southern Idaho ground squirrel at the zoo continues. In 2005, the zoo exported seven animals to suitable habitat on BLM land. Observation of the captive southern Idaho ground squirrel food use and activity patterns was initiated in 2005 and will likely continue in 2006.

Additionally, the USFWS has provided, and will continue to provide, cost-share funding to the IDFG, which hired a nongame biologist in 2004. In 2004, the biologist's primary responsibilities were to contact private landowners that had previously expressed interest in participating in a CCAA, and begin to survey their lands for southern Idaho ground squirrels. This survey work continued in 2005, with an increased number of landowners. In addition to gathering data on the presence/absence of ground squirrels, we began to establish long-term monitoring plots. We currently have eight monitoring plots and are finalizing the monitoring protocol (Carmen Thomas, USFWS, pers. comm. 2005). The preliminary monitoring design includes a combination of intensive and extensive monitoring to track southern Idaho ground squirrel populations. Intensive monitoring will include multiple visits to each site throughout the breeding season to trap ground squirrels. Information on emergence weights and breeding population structure will be collected. All burrows within the plot will be counted as an index of population size. Extensive monitoring will include a minimum of two visits per site within a breeding season. During these visits, no trapping will take place, but burrow counts will be conducted. We will also be conducting additional presence/absence surveys, the intensity and methods for which are still being determined (Carmen Thomas, USFWS, pers. comm. 2005).

COORDINATION WITH STATES

Indicate which State(s) (within the range of the species) provided information or comments on the species or latest species assessment: Idaho: The Idaho Department of Fish and Game provided information on population estimates for the 2005 season.

Indicate which State(s) did not provide any information or comments: not applicable.

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APPROVAL/CONCURRENCE: Lead Regions must obtain written concurrence from all other Regions within the range of the species before recommending changes, including elevations or removals from candidate status and listing priority changes; the Regional Director must approve all such recommendations. The Director must concur on all resubmitted 12-month petition findings, additions or removal of species from candidate status, and listing priority changes.

Approve: **Acting** David Wesley 11/10/05
Regional Director, Fish and Wildlife Service Date

Marshall P. Jones

Concur: _____ August 23, 2006
Director, Fish and Wildlife Service Date

Do not concur: _____
Director, Fish and Wildlife Service Date

Date of annual review:
Conducted by: